composition, is sufficiently high to cause crystallization at the interface of said reinforcing material and said resin composition.

B7

REMARKS

Amendments

The Specification has been amended to insert a paragraph in the Description with information of the parent applications.

Claims 1-51 and 59-61 have been cancelled. With this amendment, claims 52-58 and 62-80 remain pending.

Claims 56-58 have been amended to replace "material" or "reinforcing material" with the "fibrous reinforcement" of claim 52 from which they depend. The spelling of "aramid fibers" has been corrected in claim 56. Also in claim 56, "mixtures" was replaced with "combinations." It is believed that "combinations" seems a more appropriate term in this context.

Claims 62 and 72 were amended to recite the resin as a part of the impregnating apparatus. These amendments are supported by the specification as originally filed, including the paragraph beginning on page 7, line 19. The amendments of claims 72 and 74 to refer to the temperature of the resin composition are supported, for example, by the paragraph beginning on page 8, line 4. The amendments to claims 72 and 78 to refer to the heater location and to the temperature of the fibrous reinforcing material when it contacts the resin are supported, for example by the disclosure page 7, lines 25-28.

Objection to Specification

The disclosure was objected to for lacking information on the patent applications. This information has now been inserted by amendment. Applicants believe the basis for the objection has been corrected.

Rejections Under 35 U.S.C. § 112

Claims 1-61, 74, 79, and 80 were rejected as indefinite under section 112, second paragraph. Applicant respectfully traverses the rejection as it applies to the amended claims and requests reconsideration of the claims.

Claims 1-51 and 59-61 have been cancelled.

Claims 56-58 have been amended to replace "material" or "reinforcing material" with "fibrous reinforcement" as in claim 52.

The spelling of "aramid fibers" has been corrected in claim 56.

The Office Action appears to find it improper to include both polymeric fibers and aramid fibers in a Markush group, but including both a class of materials and a specific member of the class does not make a Markush group indefinite. See MPEP 2173.05(h) ("The mere fact that a compound may be embraced by more than one member of a Markush group recited in the claim does not necessarily render the scope of the claim unclear. For example, the Markush group, "selected from the group consisting of amino halogen nitro, chloro and alkyl" should be acceptable even though "halogen" is generic to "chloro."); MPEP 2173.05(o) ("The mere fact that a compound may be embraced by more than one member of a Markush group recited in the claim does not lead to any uncertainty as to the scope of that claim for either examination or infringement purposes.").

Claims 72 and 78 have been amended to include the resin as part of the impregnating apparatus. Claims 74, 79, and 80 further limit the resin, now part of the claims from which they depend.

For these reasons, Applicant submits that the grounds for the rejection have been removed or overcome. Accordingly, Applicant respectfully requests reconsideration and allowance of the claims.

Rejections Under 35 U.S.C. § 102(b)

Claims 51-61, 72, 74, and 78-80 have been rejected as anticipated by either the Marzocchi patent, U.S. 3,273,987, or the Nose reference, EP 0 393 536 A2. Applicant respectfully traverses the rejections as they apply to the amended claims and requests reconsideration of the claims.

With regard to the prepreg material claims, the Nose reference explicitly wets out the fibers only 70% at most. See the Abstract (10% to 70%); page 3, lines 21-24 (same). Moreover, the reference discourages attempting to fully wet out the fibers. Page 5, lines 23-25 (when more than 75% fibers separated, "excessively large resistance to deformation").

On the other hand, the substantially complete wetting of the fiber in the present prepreg offers a striking advantage for many applications in which the strength of the prepreg is important. For example, compare the results achieved for Example 7 and those of a commercially available counterpart, Verton from LNP, shown on page 23.

The Nose reference fails to disclose other key aspects of the prepreg and apparatus of the invention. As illustrated by Fig. 6, the heater (13) for the fiber is located relatively remotely from the inlet (17) to the impregnating chamber (18). The temperature of heated glass, for example, might drop 400°F. in an inch in ambient conditions. Note the guide at (16) the fiber contacts, which is going to be a heat sink and cool the fiber further. The Nose reference apparatus will not introduce the fiber to the melt at the same temperature to which it is heated at the heater, nor does the reference anywhere seek to have the fiber at a temperature above the resin temperature <u>at the time that it comes in contact with the resin.</u>

The Nose reference is instead focussed on a different end. The Nose reference uses the heater to "eliminate volatile substances . . . harmful to the shaping procedure." Page 7, lines 9-10. The temperature to which the fiber is heated is selected "to avoid the generation of gaseous substances from the fiber bundles in the next impregnation step." Page 7, lines 13-15. There is no attempt by the Nose reference to maintain the temperature of the fiber or to locate the heater near enough to the inlet so that the fiber will still be hotter than the resin when it enters the impregnating chamber and comes in contact with the resin; that is not its objective. The fact that the fiber is not kept hot is evidenced by the low degree of fiber wetting achieved.

Further, while the Nose reference mentions that its preheating temperature is above the melting point of the polymer, it never discusses the temperature of the resin in the impregnation chamber. Obviously it is also above the melting point, but how

much above? The relationship between the temperatures of the fiber, even in the preheater, and the resin in the impregnation chamber is never mentioned or suggested.

For all of these reasons, Applicant submits that the claims are not anticipated by the Nose reference. Applicant, therefore requests withdrawal of the rejection and reconsideration of the claims.

The claimed invention is also not anticipated by the Marzocchi patent. It is clear that the Marzocchi patent is concerned only with coating the glass yarn. There is no suggestion of making a prepreg having substantially no voids. See column 1, lines 10-11 ("heating and coating fibrous glass yarns"); id. at lines 26-27 ("Uniformity in size and roundness of the coated yarn is important . . ."); column 3, lines 15-17 (amount of plastisol restricted to least amount needed to provide desired coating). Any penetration appears to relate only to adhering the coating. There is no mention, or purpose, to fully wetting out these glass yarns, which are to be used for window screens and fabrics. See column 11, lines 24-31. (Of course, it is considerably more difficult to fully wet out a fiber bundle than to merely coat it.)

In addition, the Marzocchi patent is limited to plastisols, which are dispersion of particulate plastic in liquid plasticizer. These are not molten resin compositions, but dispersions. Further, the Marzocchi plastisol is delivered as "a narrow stream of plastisol against the travelling yarn." Col. 3, ll. 1-3. Thus, the Marzocchi patent does not disclose a molten resin composition or a container of a molten resin composition with an inlet and an outlet for the fibrous reinforcing material.

For these reasons, Applicant submits that the claims are also not anticipated by the Marzocchi patent. Applicant, therefore requests withdrawal of the rejection and reconsideration of the claims.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-23, 26-34, 37-50, 62-71, and 73-77 have been rejected as unpatentable over either the Marzocchi patent, U.S. 3,273,987, or the Nose reference,

EP 0 393 536 A2. Applicant respectfully traverses the rejections as they apply to the amended claims and requests reconsideration of the claims.

Applicant repeats the points brought out above, and adds the following arguments.

As discussed, the Nose reference teaches away from prepregs in which more than 70% of the individual fibers have been wet out. By extension, the Nose reference discourages one from modifying its apparatus to obtain an apparatus in which the fibers are completely or substantially completely wet out. It is settled law that teaching away is the antithesis of obviousness.

In addition to the Nose reference discouraging further wet out of the fiber, one skilled in the art who wished nonetheless to prepare a substantially fully wet out tow or roving would gather no hint on how to proceed from this reference. The reference speaks only of removing volatile substances from the fibers, which it apparently does well enough by the method shown. Once all of the substances are removed, there is really no further improvement to be made to its material, and no hint on how to achieve the different result of a prepreg having substantially no voids that the present inventor sought.

For these reasons, Applicant submits that the present invention is patentable over the Nose reference. According, Applicant requests reconsideration and allowance of the claims.

Concerning the Marzocchi patent, because the process is designed to provide a coated yarn or monofilament strand, such as a metallic wire, col. 1, ll. 10-18, to be used, e.g. for insect screens, it provides no suggestion of making a prepreg or of apparatus modifications conducive to making a prepreg.

In addition, the Marzocchi patent appears to teach away from using a molten resin composition as the Marzocchi patent teaches one to make a *coated* article, while the prepregs of the invention have a roving or tow in which the fibers are fully or substantially fully wet out, not merely surface coated.

Further, using plasticizers to make *prepregs* leads to undesirable results, as discussed on pages 2-3. If it becomes necessary, we could exclude plasticizers per our disclosure on page 10, lines 26-28.

Fully wetting out the fibers is an important aspect of the present invention. This is a critical property for a prepreg to develop an article with the desired mechanical properties. Note the Cogswell patents discussed on page 3, which teach using a plasticizer to get the wetting, but removing the plasticizer from the prepreg by volatilization to achieve the desired product strength. The present invention avoids such difficulties.

For these reasons, Applicant submits that the present invention is patentable over the Marzocchi patent. According, Applicant requests reconsideration and allowance of the claims.

Conclusion

Accordingly, reconsideration and allowance of the claims are respectfully requested. Applicants believe that the claims are in condition for allowance, and an early allowance of the application is earnestly requested.

The Examiner is invited to telephone if it would be helpful to resolving any matter

Respectfully submitted,

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Attachment Showing Claim Amendments

The following is a marked up version of the amended claim in which insertions are underlined and deletions are bracketed.

56. (amended) A prepreg material according to claim 52, comprising a [material] fibrous reinforcement selected from the group consisting of glass fibers, carbon fibers, graphite fibers, polymeric fibers, [aramide] aramid fibers, and [mixtures] combinations thereof.

57. (amended) A prepreg material according to claim 52, wherein the fibrous reinforcement [reinforcing material] comprises a high silica glass fiber.

58. (amended) A prepreg material according to claim 52, wherein the fibrous reinforcement [reinforcing material] is coated with a sizing or finishing material.

62. (amended) An apparatus for impregnating a continuous fiber material, comprising a heater for heating a fibrous reinforcing material to a first temperature, a means for applying a tension to the fibrous reinforcing material, and a container containing a molten resin composition, said container having an inlet and an outlet for the heated fibrous reinforcing material in which the heated reinforcing material is contacted with [a] the molten resin composition; wherein the container includes therein a shearing mechanism for the fibrous reinforcing material.

70. (twice amended) An apparatus according to claim 62, further including molding equipment for forming [the reinforced matrix resin composition] impregnated fibrous reinforcing material exiting the container into an article of a desired shape.

72. (amended) An apparatus for preparing a reinforced matrix resin composition, comprising a heater for heating a fibrous reinforcing material, [to a first temperature] a molten resin composition that is located so as to first contact the heated fibrous reinforcing material while the heated fibrous reinforcing material is at a

first temperature, and a compressing unit for pressing the heated fibrous reinforcing material together with [a] the resin composition; wherein the first temperature[, as measured at the point where the heated fibrous reinforcing material is first brought into contact with the resin composition,] is above the [melting point, softening point, or Tg] temperature of the resin composition.

74. (amended) An apparatus according to claim 72, wherein said first temperature is from about 75°F [up] to about 500°F above the [melting point, softening point, or Tg] temperature of the resin composition.

78. (amended) An apparatus for preparing a reinforced matrix resin composition, comprising a heater for heating a fibrous reinforcing material to a first temperature and a container of a liquid, crystallizable resin composition having an inlet and an outlet for the heated fibrous reinforcing material[and a compressing unit for pressing the heated fibrous reinforcing material together with a crystallizable resin composition]; wherein the heater is at a temperature and location so that the first temperature, as measured at the point where the heated fibrous reinforcing material is [first] brought into contact with the resin composition, is sufficiently high to cause crystallization at the interface of said reinforcing material and said resin composition.